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# UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/883,366

06/19/2001

Toshiya Ishio

1035-330

1077

7590

08/28/2002

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EXAMINER

IM, JUNGHWA M

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/28/2002

6

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/883,366

Applicant(s)

ISHIO ET AL.

Examiner

Junghwa M. Im

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 July 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 11-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All   b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restriction*

Applicant's election without traverse of claims 1-10 in Paper No. 5 is acknowledged.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Akram (U.S. Pat. No. 5,736,446)

Regarding claim 1, Akram shows, in Fig. 8j, a semiconductor device comprising:

a main conductor layer (1016) having an end that is electrically connected to an electrode pad (1002);

an insulating layer (1018) having an opening section on said main conductor layer; and

a protrudent electrode (1032) electrically connected to the main conductor layer via said opening section,

said semiconductor device, further comprising:

a metal layer (1030) provided on the main conductor layer in the opening section so that said metal layer is provided between said main conductor layer and said protrudent electrode.

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Regarding claim 2, Akram shows the protrudent electrode is made of Sn or a metal having Sn as its main component (col. 1, line 54); and

the metal layer is made of Au or a metal having Au as its main component (col.6, lines 6-16).

Regarding claim 3, Akram shows the metal layer has a thickness ranging from 0.003 um to 1 um (col.6, lines 9-15).

Regarding claim 6, Akram shows, in Fig. 8j, that the protrudent electrode is formed so that the protrudent electrode has a part, which protrudes from the said opening section, of a size greater than an area of the opening section. In Fig. 8j, the protruding electrode is ballooned out like a ball with a narrow bottom from the opening.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram

Regarding claim 1, it has been discussed previously.

Regarding claim 4, Akram shows a invented device with all the aspect of the pending claim except the metal layer including a nickel layer and a gold layer.

However, Akram also discloses prior art showing a metal layer can be made of Au and Ni (col.2, lines 25-42).

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It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Akram using Ni as a metal layer obtain better adhesion between the metals.

Also, Akram shows electroless plating for a solder bump (col. 2, lines 46-54, and col.6, lines 38-40).

Regarding claim 5, Akram shows the gold layer has a thickness ranging from 0.003 um to 1 um (col.6, lines 9-15).

### ***Claim Rejections - 35 USC § 103***

Claims 1 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Okada et al. ( U.S. Pat. No. 6,111,317).

Claim 1 has been discussed previously.

Regarding claim 7, Akram shows a device with all the aspect of the pending claim except the main conductor layer is made of Cu or a metal having Cu as its main component.

Okada et al., however, show, in Fig. 17, that the main conductor layer (14) is made of Cu (col.4, lines 65-67).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Akram using Cu as a conductive layer disclosed in Okada et al for a solder metal to be wetted easily.

Regarding claim 8, Okada et al. show, in Fig. 17, a barrier metal layer (16) made of Ni or a metal having Ni as its main component, on an entire top surface of the said main conductor layer (col.5, line 2).

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Regarding claim 9, Okada et al. show the barrier metal layer covers side surfaces of the main conductor layer (col.6, lines 45-57).

### ***Claim Rejections - 35 USC § 103***

Claims 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Stamper et al. ( U.S. Pat. No. 6,362,531).

Regarding claim 10, Akram shows a device with all the aspect of the pending claim except the limitations over a foundation metal layer under the main conductor layer.

Stamper et al. show, in Fig. 8, a foundation metal layer (134) made of Ti, Ti-w, Cr, or a metal having any of those elements as its main component, under the main conductor layer (132) (col.8, lines 12-33).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teaching of Stamper et al. into the device of Akram to enhance adhesion between metal layers.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JMI

August 23, 2002

  
Sara Crane  
Primary Examiner